In the case of the air force, due to the marked obsolescence of the equipment used in Africa in a situation characterized basically as counterguerrilla operations, it was rapidly decided that it was essential to put some hundreds of planes out of circulation inasmuch as they were devoid of any operational value on the European scene.

The initial phase aimed at a minimum re-equipping of the air force included two combat plane squadrons which were to be as multifunctional as possible, that is, capable of carrying out various kinds of missions--fire support and cooperation with naval surface and ground forces, barrage firing at the scene of a battle and dissuasive capability.

After various studies and analyses and taking into consideration the alternatives, the air force opted for the A-7 planes. Through a number of adaptations and the introduction of the most modern equipment, such as maneuvering flaps, avionics and new weapons systems, the A-7P emerged, a solution considered ingenious, less expensive, rational and adequate for our national requirements and circumstances.

The A-7 plane, whose manufacture was discontinued only recently, was originally designed and produced for carrying out maritime operations, continuing to be a part of the aircraft launched from American aircraft carriers. Through the years its unequaled success exceeded all initial expectations and it was finally adopted by the American Air Force.

Now, labeling such a plane as "scrap iron," Lemos Ferreira said, "denotes only the ill will of certain circles and a complete lack of technical knowledge about this equipment."

As for the numerous megalomanic fantasies published by the above-mentioned newspaper, the EMGFA chief stated that the first squadron, comprising 20 planes, cost the state about 5.3 million contos, including spare parts, additional equipment, backup equipment and various kinds of weapons.

"These are the facts," asserted Lemos Ferreira, who, to say the least, opposes public disclosure of an alarmist nature and particularly the announcement that the air force allegedly purchased 50 obsolete planes for 40 million contos and that, in view of the enormous sum paid for the first 20 planes, the final bill could come to 100 million contos by 1986.

Lemos Ferreira then said that to the 5.3 million contos paid toward the purchase of the first squadron we must add about 14.8 million contos by August 1985 and that the 30 planes making up the second squadron will come to a total of 20.1 million contos.

"For anyone little acquainted with the problems of military defense, even this sum could appear high," Lemos Ferreira said, "but anyone who wishes to spend nothing or very little for defense, will end up losing his freedom, possessions and money."

8568
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REPORT OF NAVY'S LONG-RANGE ROLE OBJECTIVES

Stockholm MARIN NYTT in Swedish no 5, 1984 pp 10-11

[Article by Goran Malais: "A Long Range View of the Navy"]

[Text] The supreme commander's "planning team" has, in connection with work on the ongoing perspective plan, studied future naval forces from three aspects: defense against coastal invasion, minelaying ability and surface ships.

Defense Against Coastal Invasion

The capabilities of naval warfare units are highly dependent on the mobility and vulnerability of the systems. Technical developments in reconnaissance and intelligence systems and in precision weapons mean that the vulnerability of all combat forces is increasing in varying degrees. Different tactical and technical measures are being taken in order to counteract as long as possible the development toward increased vulnerability.

Among the naval forces, submarines can in the future expect to maintain good capability to avoid enemy countermeasures. The submarine system has a high degree of survivability. The efficiency of its weapons is increasing. The system can be used for torpedo attack and minelaying and for reconnaissance missions. It will in the future be technically possible to equip submarines with missiles without reducing their torpedo capacity. Geographical circumstances will in certain situations limit their operational freedom of action.

Because of increases in weapon range, surface attack units can in more cases act in defense of our archipelago area. When the units are assembled in strength and put to sea, we must expect the risks of combat and the accompanying increased vulnerability. The units can be utilized for missile and torpedo attacks, minelaying, reconnaissance and escort missions. The ability to assemble rapidly in strength and great versatility are valuable properties in defense against invasion.

Heavy coastal defense missiles can utilize the terrain to oppose an attacker's superior detection and combat capabilities. They can be used to good effect in most areas around our coast.

The balance within naval warfare on the vulnerability aspect can be achieved in different ways. One way is to increase the protection for the surface attack units, for example, another is to increase the number of other naval warfare systems. During the work of the study group the latter course has been more closely analyzed. The results indicate that a certain increase in the number of submarines and coastal defense units can be a cost-effective measure if the effect against transport units is only being considered.

The possibilities to coordinate the time and space factors of the combat units should be improved. Common command and control systems should therefore be developed and procured.

The study has shown that the different naval warfare systems are required, and complement each other. The greatest possible operational freedom of action can be maintained if the organization consists of many different systems.

The Mine Warfare Mission

Mining is an important component in the defense against coastal invasion. It is significant even in neutrality. If we have a credible will and the ability to lay mines, the attacker is forced into tactical adaptations. Laid mines can mean that the attacker will choose another area for his landings, or be forced into time-consuming minesweeping. This latter gives us time, and forces the channelizing of the attacker, at the same time giving us freedom of action to deploy our forces in other directions.

Most mine systems are utilized in the immediate vicinity of our coastal zone, where the possibilities for defense of our mining forces are the greatest.

Mine systems consist of controlled and uncontrolled mines. Most controlled mines are laid in peacetime. They can be readied for action quickly. The development of the threat has demonstrated shortcomings in the system. Technology, however, gives good conditions for improving the system. The effect of uncontrolled mines depends on a sufficient number being laid out. Minelayers must therefore either have a large cargo capacity and good speed capability, or be many in number. To a certain extent these requirements can be reduced by development of new self-propelled and target-seeking mine types.

Alternative minelaying possibilities can be guaranteed by utilizing all naval ships and some civilian ferries as minelayers after mobilization. In case of a surprise attack, minelaying must be carried out primarily by regular naval ships.

Surface Ships for Peace, War and Neutrality

Certain types of activity place special demands on the weapons and detection equipment of warships. The aggressor must understand that our forces constitute a real threat to his activity. Only thereby can we achieve a deterrent effect.

Antisubmarine warfare has so far required relatively large ships in order to accomodate the sophisticated detection and weapons systems which are required. Technology has, however, made it possible today to equip relatively small ships with effective weapons. The coastal corvettes now under production are an example of that.

The study tested whether it is appropriate to further expand the antisubmarine requirement in ships. Such a measure would mean that the ships must be considerably larger and more expensive. The negative results in reducing the number of ships are not offset by the better performance of a larger ship.

During peacetime crises and neutrality, a large number of the actions will probably not be antisubmarine in nature. Even in such situations, however, it is of great importance to appear on the scene with systems which create respect. This can be accomplished by having participating ships cooperate with attack aircraft and coast artillery units. In many situations, however, it is advantageous if the participating unit is equipped to deliver effective fire itself. Accordingly that is a force in which the majority of the surface ships are equipped with effective weapon systems even in crises and neutrality situations.

Actions during peacetime and neutrality and the demands of war include a requirement for powerful units in sufficient numbers. So far this requirement has been satisfied by a mix of ships of varying quality. Qualified units must, in order to satisfy the requirement for the numbers of units, be supplemented with a number of simpler types of ships. The balance between ships with high and somewhat lower qualities must therefore be tested. Today it is most urgent to quickly satisfy the requirement for a sufficient number of antisubmarine ships.

Navy Tactical Control Systems Being Converted

The navy's present system of combat control ashore, in the fleet and in the coast artillery was built up beginning in the 1950's. The system is based on the voice transmission of information from radar stations and other information sources to manual plots in combat information centers. Reporting between centers is handled in the same way.

Requirements of High Speed Combat and New Materiel

The ability of the combat information and control system, during high speed combat and in a difficult telecommunications environment, to present a good foundation for the control of units is unsatisfactory. The system is demanding of personnel, and is difficult to adapt to newly acquired materiel.

Beyond the shortcomings of the combat control system, the chief of naval operations has confirmed that the navy's land-based radar stations partly need to be replaced with new equipment and reorganized for greater efficiency.

Electronic Tactical Control Equipment

On certain ships, different types of electronic plotting equipments have already been installed. Examples are ELPLO on Norrkoping-class torpedo boats, ARTE 726 on patrol boats and the NIBS system on submarines.

MARIN NYTT has previously reported on the maritime control centers with computer-aided equipment to collect, process, present and communicate information on the situation at sea.

Future Tactical Control System

During the 70's and the beginning of the 80's, because of reduced appropriations, available funds have been used to try to maintain the strength and effectiveness of the combat units. For this reason an imbalance has arisen between weapons systems and control systems.

In order to improve the ability of the control systems, the following steps and projects are being undertaken in the navy:

- Development of Project MASIK (computer-aided naval combat control system in wartime).

- Carrying out Project STRIKA 85 (computer-aided combat control for coast artillery units.

- Procurement of new radar equipment as replacement for coast surveillance radar (PS 239) and tower radar (PS 15).

- Increased cooperation between the navy's coastal surveillance radar stations and the coast artillery's close surveillance radar stations, and procurement of new radar materiel for these purposes.

- Procurement and installation of computer-aided tactical control systems for coastal corvettes and missile boats, minesweeping craft of the Landsort-class and HKP 4.

Beginning with this issue, MARIN NYTT is going to orient its readers in a series of articles concerning the above steps and projects.

9287
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PROSPECTS, PROBLEMS OF FLEXIBLE MANUFACTURING SURVEYED

Duesseldorf WIRTSCHAFTSWOCHE in German 12 Oct 84 pp 56-72

[Article: "The Revolution Takes Hold"]

[Text] Factories are changing over--as the second industrial revolution picks up speed. But things which have for a long time been technically possible are often still too expensive.

Human beings are superfluous. Conveyor vehicles move about in the lanes between assembly stations as though impelled by ghostly hands. Industrial robots inflexibly execute the motions which have been programmed into them. "It's all very spooky." Thus Professor Hans Juergen Warnecke, manager of the Fraunhofer Institute for Production Technology and Automation (ITA) in Stuttgart, summarizes the impressions received by an observer of engine production as carried out by the Japanese machine tool manufacturer Fanuc Ltd.

Although not yet at such a level of perfection as this in Japan nevertheless everywhere in the industrialized world the factory of the future is becoming an actuality. To professional interpreters of trends our society is on the threshold of a second industrial revolution which will substantially break down all traditional factory structures. This development has been initiated by and carried forward by the microprocessor which--now riper and cheaper--is giving rise to automation on an undreamed-of scale. Automation was still equivalent to mechanization 1.5 decades ago. Automation meant maximizing the efficiency of a gigantic capital-intensive complex of assembly lines and specialized machines. In accordance with the "scientific management" developed in the early part of this century by the American Frederick Winslow Taylor, factory work was divided up into many small steps in which the human being at the side of the machine could only prolong his working life by filling in the gaps left by automation.

This organization by subdividing labor into the minutest detail achieved in appropriate forms of mass production economic results which were unbeatable--as in the automobile industry. Thus it became the basis of our consumer society. Of course, the disadvantage of this organization through "time study" was its total loss of flexibility. If a new product or even a variant of a product were introduced the manufacturing process would no longer be relevant since the product-specific information was firmly bound up as hardware with the given installation.

Since about 75 percent of production, for example, in the metal-working trade, involves relatively small batches and conversions to other product variants are the order of the day, for reasons of cost it was never possible for efficiency to become established in most factories.

This is now passe. Progress in microelectronics has now made it possible for motion to be guided electronically rather than mechanically and this has made flexible manufacturing possible and permits the introduction of industrial automation even for small batch sizes.

The core of a flexible manufacturing system is the processing station which is equipped with a computer and which depending upon the program employed is capable of autonomously running specific processing operations. When several of these processing stations are coupled together one obtains a flexible manufacturing system (FFS) which by means of an integrated automatic system of transport and manipulation supplies its own tools and workpieces and removes them. Guidance and control is accomplished here through a computer system. While it is true that the investment costs of a flexible manufacturing system are 20 to 40 percent above the cost of a conventional manufacturing facility nevertheless the components of a flexible manufacturing system can be reorganized and reused after termination of one production sequence just like the components of a modular construction system.

It is not only the technical capabilities available which make this revolution in manufacturing technologies possible. The market, too, is increasingly exerting pressure in the direction of a reorientation of manufacturing. Thus ever more demanding customer wishes are accelerating product innovation; they demand a greater variety of models and intensify their demands in terms of delivery time and quality. Speaking for the consumer goods industry Rudolf Koeberle, member of the board of directors of Grundig AG, makes the complaint that "the technological tempo is in permanent acceleration. Product cycles which in the beginning of our company's history encompassed a number of years have now shortened during the sixties and the seventies to 3 and even 2 years and in the eighties to 1 year and there are now plenty of examples of substantial technological change in products during a period even less than 1 year."

Industry accepts the challenges of the dynamic market. Everywhere in the world enterprises are investing in flexible technologies in order to be able to react quickly in terms of production technique to new market trends. In the FRG the fraction of enterprises whose investments serve to introduce new production and process technologies has increased to almost 60 percent. "We are facing a boom in innovation," comments Wolfgang Gerstenberger of the Munich Ifo Institute for Economic Research. Hence order books in the area of machine construction are correspondingly well-filled. "This is a reflection of the breakthrough into flexible automation," happily declares Otto Schiele, president of the German Machine and Plant Construction Association (VDMA), and he paints a better competitive picture over the long term for the capital goods branch of machine construction.

And it is high time. As a result of investment weakness following the petroleum crisis in the beginning of the seventies the machinery in the FRG has

become visibly antiquated. The level of modernity in the metal-working trades, that is, the percentage of facilities which have not been written off, has slumped from 62 percent in 1970 to 56 percent in 1982. In the United States the picture is similar. There every third machine tool attains a biblical age of more than 20 years and in England every fourth machine has been in operation for 20 years. Only Japan can avail itself of a younger machine shop. Only 18 percent of the machine tools there are older than 20 years. And 61 percent of the machines have been put into operation only in the last 10 years.

The cornerstone of the new computer-controlled manufacturing technologies had already been laid as early as the beginning of the fifties and sixties. It was then that the first numerically controlled machine tool emerged, developed by the Massachusetts Institute of Technology and it was then that the first computer-controlled robots were exhibited and also it was then--likewise in America--that the first experiments in computer-based design were undertaken.

Consequently, the individual components are already well-known techniques. The propulsive force of the factory of the future is now coming from the integration of all these elements such as numerically controlled machine tools, industrial robots, automatic transport systems and fully automated shelf storage. But up to now the production process has consisted of two parallel subsystems: integration is nothing but the fusion of material processing and information processing. Material flow and the flow of information are embedded in a well-balanced system so that finally "the right quantity of goods is produced at the right time for an existing demand," in the words of Jan Carlsson of the Computer and Electronics Commission in Stockholm.

The search for information and the acquisition of information consequently need no longer be left to haphazard human behavior. Therefore the hopes of industrial strategists have fixed upon the Kuerzel CIM. CIM stands for computer-integrated manufacturing and describes the all-encompassing use of modern computer technologies in flexible automation.

Building upon a common data bank, there are combined under CIM's umbrella data processing systems for development and design (CAD), manufacturing planning (CAP), control of machines, facilities and processes (CAM), quality control (CAQ) and sometimes additional industrial areas. This combination breaks through conventional boundaries of classical organizational functional areas. Development, design, manufacturing and the management of materials grow together and this requires a uniform style of thinking not only on the part of management but also on the part of all qualified employees.

The task confronting CIM is scarcely an enviable one: the goal is to coordinate the hardware, software, data banks and communications systems in the factory in such a manner as to assure a cost-optimal assembly line production, analogous to that in the processing industry, from the design stage right up to assembly.

In the meantime the theory is a gray area. Just the transition to partially integrated solutions such as CAD/CAM creates in practice enormous engineering and organizational problems. It is true that one hears lots of talk about

integrated computer-supported design and manufacturing but at the present time in the entire world there are known to be at most 10 to 20 integrated CAD/CAM systems which are capable of going the whole route from design to manufacturing by digital electronics. As recently announced in an investigatory report by the Industrial Engineering Administration of German Industry, there exists an even more confusing multiplicity of hardware and software crowding into the market under the title of CAD/CAM. But among all these there is not to be found any sufficiently matured system capable of guiding the designer's pencil in all phases of model geometry, capable of producing from that the parts lists, capable of planning work and of developing a manufacturing process and finally of producing the program required by numerically controlled machines.

Even the setting up of flexible manufacturing systems cannot be just shaken out of one's sleeve. The time schedule for the production of the flexible manufacturing system in the Friedrichshafen Gear Factory AG demonstrates the difficulty of implementing the new technologies. There it took as much as 5 years to accomplish the transformation from workshop manufacturing to the organization of 14 interlinked manufacturing cells. The difficulties arose from the relative multiplicity of various designs and variants of the product--the gear boxes which during manufacture necessitate differing sequences of processing. The old production process had to be completely transformed, the various processing sequences had to be combined into manufacturing cells in order to process the workpieces--organized in parts families--on an assembly line basis. But the flexibility achieved is impressive: the workpieces can be changed daily, even hourly and the batch sizes vary between 50 and 500 units.

But why this expenditure of effort? "The most important argument would be the shorter run-through time," declares Erwin Ziebart who is in charge of technology in Friedrichshafen. "We want to be able to install a gear train ordered in the evening into the truck the next morning. That would be hardly possible with a conventional system," says Ziebart in justifying this technological pioneering. And there is another advantage: shorter run-through times require less storage, thus liberating capital which up to now had been unproductive.

The flexible manufacturing facility in Friedrichshafen has been promoted by the Federal Ministry of Research and Technology as a pilot facility. Users of this technology who lack such state support must move fast with their investment--a single flexible cell is scarcely obtainable for less than 1.5 million marks--if the cost is to be recovered. "Then the full utilization of the machines becomes the decisive factor," reckons Siegfried Hofmann, assistant in the management of the Schwaebian machine tool manufacturer Trumpf GmbH and Company. "At 200 marks per machine hour the installation must run, run and run again." On all three shifts preferably.

In manufacturing at Trumpf this has already become a reality. The six smaller flexible manufacturing systems installed there are working round the clock. Since it is often hard to obtain qualified personnel for a 24-hour operation at economically acceptable cost the factories are compelled to arrange their production so as to make possible a largely low-personnel operation at a high

level of reliability in terms of machine breakdown. But this necessitates extensive automation of the periphery. In order to fully exploit automation it is necessary to give up automated insular procedures and as quickly as possible replace them with more comprehensive combined procedures. This involves a change in fundamental economic principles: in an extreme case the ratio of fixed cost to manufacturing cost rises to 100 percent. Hence the "economics of scale" principle--the reduction of cost as a function of higher batch sizes--becomes less and less important.

Under the conditions of flexible automation different products can be profitably produced together since the setup times--otherwise the most costly element in conventional manufacture at low batch sizes--diminish with increasing levels of flexibility. Therefore the factory of the future will be in a position to sharply expand the number of products and product variants produced without incurring additional cost. "The old conflict between manufacturing and sales over product variants will be resolved," prophesized Professor Guenter Spur, chief of the Institute for Machine Tools and Manufacturing Technique at the Technical University of Berlin.

But there still remains this conflict of goals. We are dealing now with a new manufacturing concept which starts with the design of a roughed-out product which is independent of the particular model and which is subsequently tailored to suit the customer's wishes at a point in time which is as late as possible--perhaps not until it has reached the delivery depot. In this way it is also possible to react quickly to changed market conditions.

While it is already possible to achieve a high degree of flexibility in processing through the use of modern computer-controlled machines, there are still substantial obstacles to be overcome in achieving a flexible automation of assembly. Such peripheral elements as calipers, storage magazines and classifying devices still lack the changeover flexibility possessed by industrial robots. For the peripheral elements involve sensors as well as control devices. But even by 1985 according to an estimate of the Stuttgart Fraunhofer Institute for Production Technology and Automation (IPA), fully automatic programmable assembly systems will be set up in conjunction with industrial robots. The people in Stuttgart are reckoning with over 100 such situations by the year 1988.

Apart from some special problems, the factory of the future is today already state of the art. "Perhaps the only thing still lacking is a fully developed sensor technique," says Professor Walter Eversheim, specialist for automation technologies at the Rhineland-Westphalia Technical Advanced School in Aachen. "Otherwise the limits are purely economic." Thus the competitive capability of flexible manufacturing systems as compared with human labor power is largely determined by the amount of time required to produce the software for a specific product. If the life cycle of the product is less than the time required to produce the software then obviously conventional manufacturing is the superior procedure.

Basically the achievement of the unmanned factory depends upon the conditions of development of wage and capital costs required by a continuous program of

automation. While the release of one employee merely yields a linear reduction in wage costs, the resultant capital costs increase exponentially. "For this reason it will be extraordinarily difficult," says Professor Nam P. Suh of the Massachusetts Institute of Technology, "to justify the existence of completely unmanned factories."

Nevertheless, the more highly evolved and inexpensive these technologies become the greater will be the competitive pressure to employ the new flexible techniques, particularly since in addition to cost arguments they can also offer such advantages as uniform quality and reliable scheduling. "Nothing is gained by waiting" is the warning offered to indecisive entrepreneurs by the innovation expert Horst Wildemann, professor of manufacturing science in plant and industry at the University of Passau. Moreover, "the new technologies demand a considerable fund of experience which cannot be bought but which must be laboriously acquired by the user through an accumulation of knowledge." Initially, this experience is gained at the expense of overall productivity because in the startup phase the user encounters substantial additional costs resulting from increased expense for planning and personnel.

For this reason many plants hesitate to change their production over to flexible automation. In particular, there are many small and medium-sized factories which have a hard time making the change. But Bonn is helping out. Anxious lest our manufacturing industry, which is primarily in small business, lose ground in international competition the FRG has embarked on an extensive support program which provides 530 million marks for the period from 1984 to 1987. This support program aims primarily at the industrial use of computer-controlled systems in manufacturing technology as well as the development of industrial robots and manipulatory devices.

"Have things really reached the point in the FRG where new technologies can succeed only with the help of subsidies?" This critical question put by the business consulting firm of Roland Berger and Partner GmbH nevertheless fails to label German entrepreneurs as backward when it comes to innovation. Because in other great industrial countries generous subsidies are being provided and the key importance of this manufacturing technology in international competition is understood.

The United States within the framework of its air force program is making available about $300 million for the development of CAD/CAM systems, flexible manufacturing installations and robots. The Japanese Government is spending the sum of 330 million marks annually for flexible manufacturing systems and the French Government is providing as much as 4.1 billion francs for technology transfer. Even the Thatcher government which ordinarily talks so much of free market forces is subsidizing the changeover to CAD systems, robots and flexible manufacturing with much more than 100 million pounds a year out of the state treasury.

It is no wonder that in this artificial greenhouse atmosphere the market is growing explosively. The sale of computer-controlled equipment capital goods just by American and European firms climbed from $1.2 billion in 1982 to $1.6 billion in 1983. For this year the estimates are assuming a growth rate of 43 percent and sales are expected to leap to a record height of $2.3 billion.

The German manufacturers who only 2 years ago were loudly complaining about their loss of international competitive capability are now quite visible in the marketplace with their customary self-confidence. "None of the approximately 18 German large-scale projects for flexible manufacturing which are still in the planning phase will pass into the hands of non-European competitors," is the assurance of Helmut Hamer, business manager of the established Berlin firm Fritz Werner Machine Tools GmbH. In fact, the individual demands of these complex manufacturing systems are evidently congenial to the Germans. The Japanese competitors, accustomed to producing cheap standardized equipment, cannot keep pace when it comes to specially tailored equipment. The machine construction expert Eversheim summarizes his impressions in saying "the German competitive advantage consists not in the individual components of manufacturing technology, since in robot technology the Americans and the Japanese are undoubtedly the leaders, but rather in the production of systems immediately ready for use."

Among users of this equipment the technology-fascinated Japanese are distinctly out front. Of the approximately 200 flexible manufacturing systems installed worldwide about one-third are in Japanese enterprises. Japan, after Sweden, has the highest robot population; 25 percent of Japanese machine construction factories use CAD systems. By way of comparison, in the FRG the figure is only 2 to 3 percent. "It makes one positively uneasy to see how consistently the Japanese are applying the new technologies," declares IPA staff member Manfred Schweizer.

In the meantime the production shops of such successful machine tool manufacturers as Fanuc and Yamazaki have come to be cult shrines of technologists from all over the world. The status of technology there impresses the technologists but nevertheless leaves massive doubt as to the economic merit of these ostentatious projects. One thing is certain: the Germans, too--though without so much publicity exploitation--have a sensational project. This is the manufacture of the Tornado at the Messerschmitt-Boelkow-Blohm Company in Augsburg which, in terms of flexibility and integration, is considered to be a model for the world.

But the value of such pilot projects for most factories is nevertheless being disputed. Joachim Poeppel, member of the board of the Heidelberg Printing Machines Company, has said "What is important is not so much expensive process innovations but rather a purposeful advance step by step within one total concept."

Despite all differences of opinion as to the speed with which the substitution of labor and capital will proceed, no one questions the fact that the process of decoupling man and machine is going forward. The end of the line for this progress will be the fully automatic superfactory which just like an airplane will be driven only by a small highly trained team at one control panel. As the development of communications technology progresses it is also possible to conceive, according to Professor Spur, a model of the "decentralized factory" in which the manufacturing islands are operated by individual workers or by groups of workers linked together. Or one may imagine the following situation: In order to deal with the high investment costs of computer-controlled flexible

manufacturing one requires an economic effort which is no longer possible for average-sized enterprises. And thus for cost reasons it would appear logical for "several enterprises to support one flexible manufacturing facility" (Spur). Or: The conventional form of enterprise may be broken up in favor of two separately operating parts: the computer-integrated, highly flexible automated factory on the one hand and an enterprise having a purely marketing orientation on the other hand.

No matter how fantastic our visualization of the organizational future of the factory may be, for the technologist the stormy years of the breakthrough must be followed by sober day-to-day operations. It is the judgment of Wolfgang Zeppelin, chief of design and development in the Traub Machine Factory GmbH, that "the next 10 years, seen from the point of view of technology, are certain to be less exciting than the last 10 years." He is right, but it is the correct configuration of this day-to-day operation and the continuous implementation of the new technologies which will determine whether or not in 10 years enterprises will continue to exist in the marketplace.

In the next part of this article: how the new manufacturing technology creates inhumane jobs--and why something must be done about this.

8008
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NATIONAL GOLD RESERVES: TO SELL OR NOT

Lisbon O JORNAL 19 Oct 84 p 36

[Text] Cheap gold "cost" another 45 million to the budget. If Portugal were to have sold at the present time any part of its 635,575 tons, it would have gotten a bad deal, since the current quotation for the yellow metal in international markets is the lowest in years. Yet in deciding not to sell, the government did not avoid another inconvenience: the worsening of the state budget deficit by 45 million contos.

At the present time, an ounce of gold is quoted at about 340 dollars, that is, 27 less than the 367 it was reported at the beginning of the year.

According to the report of the Bank of Portugal, on December 31, 1983 Portuguese gold reserves were conservatively estimated at about 685 million contos, using a quotation lower than the international market, fixed on that date by the Central Bank at 254 dollars per troy ounce, equivalent to 31.1035 grams.

In strict accounting terms, the current value of the gold reserves on deposit in the Bank of Portugal is somewhere around one billion contos, but that is a purely academic hypothesis, since any attempt to unload large quantities of the yellow metal could precipitate an even greater drop in the international quotation.

For those favoring the sale of gold as a way to pay the foreign debt, 1980 would have been the year in which such an operation, theoretically, would have been the most favorable, since the ounce at that time got up as high as 800 dollars.

The way the experts figure it, if that government, with Cavaco Silva running the Finance portfolio, had sold half the existing reserves, that would have been enough to pay off the entire foreign debt. But even in that case, the hypothesis would have been academic, given the risk of a drop in the quotation brought about by the sale of hundreds of tons of the metal.

Today the situation is substantially different, both because the Portuguese foreign debt has doubled in the last three years, while the gold quotation represents only 43 percent of its "record" value of 1980.

But according to a source close to the staff of the finance minister, another factor is said to have influenced the government not to sell any gold at this time. The decision took into account present expectations for a deficit in the balance of current accounts below the forecast at the beginning of the current fiscal year.

According to that source, instead of a deficit of around 1.25 billion dollars, the balance of accounts could end up with a negative figure between 800 million and 1.0 billion dollars.

In such circumstance, the source stated, the government preferred to "ride out the storm" which would naturally be unleashed in the face of an increase in the deficit of the 1984 Budget of State, translated into an additional "gap" of 45 million contos, which raised the negative balance to 249.5 million.

12430
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BRIEFS

BANKRUPTCIES RISE--In the first six months of this year, the total number of business bankruptcies was 88, representing an increase of 31 percent over the corresponding period of the previous year, as reported by the Credit Insurance Company (COSEC). In 1983, total bankruptcies for the entire year were 129,whereas in 1982 they did not exceed 101. The average capital stock of the bankrupt companies is around 4,000 contos, and the average number of employees of each was about 50, which taken together with the average capital stock indicates that the companies affected are mostly of medium size. Broken down according to the type of business, the "textiles and clothing" manufacturing industry shows the greatest number of bankruptcies during the six months under review -- 18.2 percent of the total. Of the remaining sectors, which present variations of little significance, the only observation of note is a worsening in the industry and commerce of "food and beverages." [Text] [Lisbon SEMANARIO in Portuguese 20 Oct 84 p 17] 12430

WOMEN'S EARNINGS BELOW MINIMUM--About two thirds of Portuguese working women make less than 15,000 escudos per month, according to a 1983 survey reported to EXPRESSO by the Commission on the Feminine Condition (CCF), concerning the difference in wages paid to men and women. The national minimum wage is 15,300 escudos. The survey, which was limited to firms of over 10 employees, excluding public services and farming activities, showed that only 9.6 percent of women earn an average salary higher than 30,000 escudos, while men who earn this salary level exceed 16.5 percent. The Commission also noted that salary differences according to qualification levels are 22.3 percent less for women in skilled trades and 24.4 percent for semiskilled workers. CCF officials attribute this fact to the idea that women do not need to work, and only the growing economic crisis starting in the seventies has led women to go outside the home to help guarantee, together with their husbands, better financial support for their families. Figures for 1982 made available by the commission taking into account rates of economic activity according to marital status show that the greater percentage of women with fixed jobs and earnings are the unmarried (60.4%) and the divorced and separated (68.8%). [Excerpts] [Lisbon EXPRESSO 20 Oct 84 p 4] 12430

1983 BANK UNION REPORT--The report released a few days ago by the Union of Portuguese Banks (UBP) mentions that "1983 was not a propitious year for the development of activity by banking institutions in Portugal," with the bottom line for the year reaching 89.7 thousand contos. Operating profit was 66.3 thousand contos, and the balance of the profit and loss account was 23.3 thousand contos. Credit extended by the UBP increased 14.4 percent in relation to 1982, absorbing only 54.8 percent of funds deposited, which by December 31, 1983, had reached 184.5 million contos, representing an increase of 16.7 percent. [Text] [Lisbon DIARIO DE NOTICIAS in Portuguese 23 Oct 84 p 5] 12430

PETROGAL EARNINGS POOR--The high tax burden which PETROGAL [Portuguese Petroleum Corporation] had to bear in 1983 resulted in net earnings for the fiscal period of only 200,000 contos, the second poorest in the past 5 years. According to the firm's financial statement, now published, although the gross earnings were on the plus side to the tune of 4.7 million contos (higher than in 1982) in current results for the period, in actuality the net earnings after tax deductions were only 200,000 contos. The statement is an indication that the tax law in effect is inadequate under present economic-financial conditions in that it does not accept the provision for potential exchange differentials as part of the cost of the exercise; thus, the sum of 4.3 million contos was included in the collectible items. [Text] [Lisbon O JORNAL in Portuguese 16-22 Nov 84 p 17] 8568

CSO: 3542/52

AGRICULTURE MINISTER ROMERO ON EEC TALKS

Madrid DIARIO 16 in Spanish 28 Nov 84 p 5

[Interview with Carlos Romero, Spanish Minister of Agriculture; Madrid, date not specified]

[Text] [Question] What is the status of the negotiations with the EEC and under what conditions is Spain joining in the latest round of negotiations in Brussels?

[Answer] This negotiating session is very important because it should come close to or even settle the industrial issues, and bring us closer to agreement on issues affecting the fishing industry. However, there are basic questions regarding agricultural items, such as wine and olive oil, on which Spain has already stated its position, where hopes for a settlement are still premature. In other areas we find ourselves facing a divergence between the Community's positions and Spain's. Progress is not occurring as fast as might have been expected a few months ago, but I believe this is because the EEC itself has serious internal disagreements and also because it is maintaining a very cautious stance in the negotiations. I think that fears about Spain's commercial importance have been exaggerated and that this has elicited very defensive attitudes in some countries.

The issues on which positions are the farthest apart concern the sensitivity of the citrus industry and the terms the EEC is seeking to impose on fruits and vegetables, terms that Spain in turn is proposing for the rest of the continent's products. In our opinion, there is one sector that should enjoy all of the protective mechanisms, and that is the dairy industry. Progress has been made on this point and the EEC is willing to grant the maximum concessions.

Fishing Concerns Ready for Settlement

[Question] What is the situation concerning the fishing industry at this moment?

[Answer] The differences have been very great. This issue is also considered very difficult to reach an agreement. However, following a tour of several North European countries, many obstacles to agreement on various aspects of

this question have been resolved. I am moderately optimistic about the possibility of reaching an agreement more quickly than we had thought possible. The basic difference is the transitional period. The EEC seeks a period of 10 to 15 years, while we favor a term of 7 years. I believe that our position will win. After that, small differences separate us, such as access to waters off the Irish coast, or the conflict over French fishing grounds. Except for that, and this area is very extensive and of vital importance to Spain, obstacles to agreement on the issues have been fairly well removed on the level of bilateral and commission relations. The only thing left to do is to state our acceptance of the agreement.

[Question] Does the fact that five Spanish ministers are meeting with their French counterparts in Paris this weekend imply progress?

[Answer] That meeting is part of ongoing contacts that several of our ministers have maintained with various Common Market countries during the past few weeks. It is also in line with talks I have had with seven of my counterparts in agriculture and five in fishing, as well as with contacts with Boyer, Almunia and Carlos Solchaga have made. As part of this strategy, we have achieved agreement with two or three ministers, as happened in the FRG. We sought to take advantage of this round of talks to state our position to the French side and to continue to press on some issues. Our objective is for the French people to give instructions to their delegation to move on some of the contents of the negotiations.

[Question] Does France continue to be the principal obstacle to our entry?

[Answer] No. Each country is raising difficulties about products that affect them. Sometimes it is not even a whole country, but just regions. They are negotiating from hard-line positions because in general they are seeking to justify internal readjustments by citing the talks with Spain. The EEC is a very complex commercial mechanism with remarkable systems of production and significant budgetary weight. But it also has some very serious surpluses. Every year it is harder to reach medium-range agreements, and they are very much influenced by day to day conditions. In this complex, world, the incorporation of a country with an agricultural industry as important as Spain's leads to significant modifications. You realize that many countries want to have you as an ally in the EEC later, along one line or another, and they invite you to participate in future discussions.

[Question] In this final stretch, has the community's negotiating position hardened?

[Answer] We are all negotiating from a hard line. Beyond statements about Spain's incorporation, which is accepted as a fact, negotiations within the different economic spheres are extremely tough. These have nothing to do with prices or regulations, and we must bear in mind that the Community negotiators have had the difficult experience of four previous expansions.

The EEC is trying to be prudent, to tie up lots of loose ends and to leave issues unencumbered. Also, Spanish agrarian sectors are exerting very strong pressure on the administration, just as groups in other countries are exerting pressure on their governments. This is normal and it cannot be any different.

No Alternative

[Question] Some interested sectors, as well as the opposition itself, have on occasion criticized the negotiating criteria of the present team. Is there an alternative?

[Answer] Outside of tactical positions, there is full agreement on this issue. There are no other negotiating alternatives, and if there were, I wish someone would explain them to me. We should not forget, either, that the basic documents existed prior to this government. With regard to previous positions, perhaps special emphasis has been placed in recent months on offering the maximum protection to the least protected sectors. Before 1982, emphasis was placed, somewhat naively, on the stronger sectors or those with the capacity to export, not on the ones that needed protection more. This is perhaps the only important change with regard to the previous government's negotiating strategies. We have held dozens of meetings with the agricultural sector every time there was a document or a response from the EEC, or upon our return from any trip, and I can say that there are no other strategies.

[Question] What attitude is the government maintaining during this last phase?

[Answer] This government has no complexes on an international level, because we have no need for any democratic confirmation, nor do we have any need on a technical level. We have an extensive technical establishment which has been preparing in Common Market areas for many years, which knows its legislation very well, which has spent much time in Brussels and is very well known by the Community. Because of this, we do not suffer from any complexes or feelings of inferiority.

What we have made clear is that without certain minimum guarantees on agricultural, fishing or industrial questions, the treaty cannot be signed in accordance with national interests. From that perspective, we are negotiating calmly enough, although it is not easy to resist the pressures of a society that thinks that something is going to be settled in every session.

[Question] Are you, nonetheless, pressured by the government?

[Answer] No. I think this is very clear and it is something that all of us, including the prime ministry, have been repeating ever since June. We are not influenced by anything, and I have the impression that they are beginning to believe us. Of course, there is no pressure from the PSOE [Spanish Socialist Workers Party] congress either. Proof of this is that it will be held, and we will continue negotiating. Actually, the only thing that influences us is the contents of the negotiations. We are not obsessed with dates.

[Question] Could the record agricultural production this year add any difficulties to the negotiations?

[Answer] The EEC has very good information about us. This is normal. We also know all about their production, their cycles and whether they have had a good year or a bad one. The commission's technical teams do not base their opinions merely on whether the business climate is good or bad. In the Community, what impresses them more is that we have succeeded in implementing production policies and meeting objectives for sectors that were experiencing growth, as well as those that were suffering decline.

[Question] What is the situation with the "green conversion"?

[Answer] This whole type of process is always a medium-range proposal. I think at this time we have a more balanced agricultural economy than does the Community itself. They suffer from more deficits and also more surpluses at the same time. They produce too much grain, butter and dairy products, wine and vegetable oil. Our own agricultural industry does not suffer from these imbalances. We will continue to follow the same path, and that means continuing along the same lines within the EEC. We have the advantage in that part of this process will be accomplished with Community funds, which is an important factor for us.

[Question] Is there final confirmation of January 1986 as the date of Spain's entry into the Common Market?

[Answer] This is their starting point and it is recognized by all the member states. The big contradiction is that the data seems reasonable to both parties and no one has mentioned changing it, but the problem is that meanwhile, the sectoral negotiations are only progressing as best they can. If the EEC were to agree to 95 percent of our positions, I would sign an agreement right now. But at present, the distance separating us is much greater, and we cannot conclude the negotiations yet.

[In box] Down With Complexes

According to Carlos Romero, the effects of Spain's integration into the EEC will cease to be noticed beyond a period of 6 to 10 years. Over the short term, there may be effects in the area of prices or business fluctuations, but still it is to be hoped that "it will be beneficial for the Spanish economy and agricultural industry to move into a much broader competitive market than the present one."

According to the minister, competition will provide an incentive for specialization "and it will erase many historical complexes from this country. It is likely that we will discover that there are business sectors that are much more dynamic than people think and that certain protectionist fears which have burdened us for centuries will be shown to have had little reason for existing."

Carlos Romero is convinced that "this is the first time in this nation's history when the European option triumphed because--also for the first time--an absolute majority of Spanish society believes that our historic destiny is linked to the destiny of this continent."

8631
CSO: 3548/59

DROP IN PRIVATE SECTOR STEEL PRICES TO TRIM STOCKS

Istanbul DUNYA in Turkish 23 Nov 84 p 6

[Report by Bayram Basaran]

[Text] Iron and steel manufacturers in the private sector have launched a major price campaign against imports. Price cuts of as much as 15 Turkish liras per kilogram in the Istanbul wholesale market last week prompted criticism from wholesalers and end users.

Ragip Cingillioglu, a partner in the Cingillioglu Steel Trading Corporation, said that the primary purpose of the 15-lira price cuts announced by the Colakoglu Metallurgy Corporation and the Cukurova Metallurgy Corporation on pig iron is to halt steel imports and that the said firms will raise their pig iron prices as soon as steel imports are halted. Cingillioglu said:

"Restrictions on construction steel imports were lifted last month as a result of temporary high demand and an abnormal hike in construction steel prices by private sector firms. However, when iron and steel producers in the private sector realized that they cannot compete with the very low prices of the imports they decided to cut pig iron prices by 15 Turkish liras per kilogram overnight. The primary purpose of this price cut is to halt imports abruptly and to recapture the market. It is a fact that steel prices will begin rising again in the coming days. Following price cuts by private sector firms, steel prices dropped to about 135 Turkish liras [per kilogram] from about 155 to 160 Turkish liras last month. Another factor in the decline of round iron bar prices is the fact that demand for this item has declined considerably because of the season."

Meanwhile, Abdulkadir Kusin, a member of the Iron Steel Professional Committee of the Istanbul Chamber of Commerce, described the abrupt decision of the pig iron producers to cut prices overnight as a major success for imports and said that the goal of freeing imports was to reduce prices. Stating that any size of steel bars can now be purchased on market, Kusin contended that steel prices will be able rise by only 1 to 2 Turkish liras a week and that there will no longer be any abnormal price hikes as before.

Meanwhile, Nuri Colakoglu, Chairman of the Board of the Colakoglu Metallurgy Corporation, pointed out that in countries from which steel is being imported steel producers receive government subsidies ranging from 50 to 70 percent and

said that his firm has cut prices to halt imports. Noting that the freeing of steel imports with only 1 percent customs duty has begun to hurt the iron and steel industry in Turkey, Colakoglu said:

"The steel that is being imported following the freeing of imports is subsidized by 50 to 70 percent. Moreover, the government's decision to reduce the customs duty on these imports to 1 percent has given rise to unfair competition in the domestic market. In response, we, the private sector iron and steel producers, decided to cut pig iron prices by 15 Turkish liras per kilogram. We thus reduced pig iron prices from 120,000 Turkish liras per metric ton to 107,500 Turkish liras per metric ton. Today, the Colakoglu and the Cukurova corporations are charging the same prices for pig iron in the market."

Stating that although prices have been cut the delivery of steel imports for which contracts have been signed will continue, Colakoglu said that so far they have failed to score any success against imports. Noting that it is exports that are keeping the iron and steel market alive, Colakoglu said: "Turkey's steel production is much higher than the needs of the domestic market. In view of the fact that demand in the domestic market will grow substantially when factories begin operating at full capacity, exports are seen as the only way to resolve this situation."

Meanwhile, Sami Sari, the leader of the Turkish Building Contractor Employers' Union, said that price cuts in the iron and steel market will not mean the revitalization of the construction sector and that a number of radical measures must be taken to revive the construction sector. Sari added: "Iron and steel prices have been cut to trim stocks and to alleviate the cash flow problem."

Noting that the recent increase in pig iron imports has also been a factor in the drop in prices in the iron and steel market, Sari said:

"However, the low prices observed in the iron and steel market recently is not a deep-rooted and permanent situation; the prices have dropped only temporarily. Indeed, the Turkish Iron and Steel Works Directorate General has not cut its prices. What has happened is that private sector iron and steel dealers who were selling their products in the black market at prices higher than those of the Turkish Iron and Steel Works cut their prices at the end of the construction season with an eye to trimming their stocks and to alleviate their cash shortage problems. Their goal is to sell their stocks quickly to alleviate their cash shortage problem."

9588
CSO: 3554/53

PORTUGUESE TANKERS RETURN TO IRAN

Lisbon A TRADE in Portuguese 22 Oct 84 p 15

[Excerpt] Portugal's recent decision to go back to buying oil from Iran is justified by the fact that Iranian crude is cheaper by 15 to 20 percent than that of other producers. Since Portugal needs 8 to 9 million tons of crude oil it will save 50 million contos if it buys all of it from Iran.

The Soponata ship "Marofa" left last week for the Persian Gulf "without making clear whether it is going to Kharg Island," said a spokesperson for the company.

"There are several cargos to pick up in the Gulf during this quarter, and the exact port where the pickups are to be made depends on contracts signed by Petrogal, which are not always known to Soponata by sailing date," added Maria Aires, Soponata's director of operations and planning.

The Soponata official declared, "Contrary to news reports in Lisbon, the supertanker "Neiva" has already put in at Kharg this year to take on crude for Petrogal's refinery in Sines."

As to whether the ships "Marao" and "Ortis Bettencourt," which are currently headed toward Lisbon, might go on later to Khrag, Maria Aires stated "we still don't know the routes, but even if they're toward the Gulf, nothing indicates that that means Kharg.

"It would be an exaggeration to use all this capacity, which is a substantial part of our shipping capacity, just in one port, and especially Kharg," she added.

Crew Insurance up From 5 to 15 Thousand Contos

Each crew member has been insured for 15,000 contos because of the high risk of this voyage. The tanker "Marofa" is also covered by insurance for a large amount, with Iran obliged to pay the premiums for such insurance.

"Soponata has a contract for carrying barrels, marketed by Petrogal, and the routing of its ships, in large part, follows the contracts worked out by the refining company and which are practically always made at the last minute, said Maria Leonor Aires.

Regarding the option for taking on oil at Kharg, because of the lower selling price, the Soponata official said that she was "not acquainted with the risks, since the contracts are signed by Petrogal."

As to the increase in life insurance for ships' crews in the vicinity of Kharg from 5 to 15 thousand contos, Maria Leonor stated that "there are contract provisions allowing for subsidy increases for areas throughout the Gulf region, corresponding in some cases to 100 percent of salary figures.

12430
CSO: 3542/036

BRIEFS

OIL EXPLORATION SIGNED--A contract was signed today in the Ministry of Industry and Energy with Geophysical Service (GSI) to carry out a geophysical prospecting campaign (seismic, magnetic, and gravimetric) over an extension of 4,500 kms, to last two to three months. This is a first step in the strategy that the Office for Petroleum Exploration and Exploration (GPEP) has adopted since the beginning of the year toward revitalizing such exploration in Portugal by specialized foreign companies. The prospecting will be carried out under a plan drawn up by GPEP in Portuguese offshore areas extending from the Porto parallel to the Portimao meridian, using a seismic ship carrying the most sophisticated equipment. Data obtained will be analyzed later in Bedford. The work is of a nonexclusive nature and will be carried out without any obligations to the Portuguese state. Marketing of the final product, which is aimed to attract the petroleum companies, will be up to GSI and GPEP, under arrangements providing for reimbursement of costs incurred in carrying out the work, and then for Portugal and GSI to share equally in the marketing results for the duration of the contract, after which any eventual continuing profits will revert exclusively to the state. [Text] [Lisbon DIARIO DE NOTICIAS in Portuguese 23 Oct 84 p 5] 12430

CSO: 3542/036

OIL COMPANIES REDUCE PETROLEUM PRODUCTION

Istanbul DUNYA in Turkish 23 Nov 84 p 3

[Text] Ankara--Domestic crude oil production by the Turkish Petroleum Corporation, the Ersan Corporation, Turkse Shell and Mobil has begun to decline. The total crude oil production of the said firms in 1984 is expected to be 6 percent less than last year's production.

According to the projections of the Ministry of Energy and Natural Resources, domestic crude oil production will reach 2,069,800 metric tons by the end of this year. This amount 6.1 percent less than last year's output of 2,203,400 metric tons.

It is estimated that the crude oil production of Turkse Shell, which is one of the largest producers by Turkish standards, will decline by 14.4 percent compared to last year. While the Turkish Petroleum Corporation is expected to reduce its production by 2.2 percent, Mobil's output is expected to rise by 12.4 percent.

By the end of 1984, the Turkish Petroleum Corporation is expected to produce 947,800 metric tons of crude, Turkse Shell is expected to produce 840,800 metric tons while Mobil will try to attain its production target of 280,000 metric tons.

The Ersan Corporation is the smallest oil producer in the country. Ersan produced 3,200 metric tons of oil in 1983. This year its production is expected to decline by 69.9 percent to about 1,000 metric tons.

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